

**Rombough, Kyrik**

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**From:** Colin Campbell [campbell@rtpenv.com]

**Sent:** Friday, August 29, 2008 5:04 PM

**To:** Rombough, Kyrik

**Subject:** Hyperion air permit application - follow-up supplemental information

Mr. Rombough,

As a follow-up to my email message of last night, I am attaching additional information you have requested regarding BACT for VOC emissions from storage tanks.

Thank you for your attention to this matter, and have a pleasant holiday weekend.

Colin Campbell

09/08/2008

Summary of Costs and Emissions for Upgrading Fixed-Roof Tanks Storing Heavy Liquids

Tank ID Number	Liquid Stored	fixed roof VOC tpy	IFR VOC tpy	IFR capital \$
IP14-1	Inalk Alkylate	69.28	0.30	500,000
IP14-2	Inalk Alkylate	69.28	0.30	500,000
IP15-1	Inalk C12+ Stream	0.02	0.06	300,000
IP16-1	Straight Run Kerosene	1.78	0.17	800,000
IP16-2	Straight Run Kerosene	1.78	0.17	800,000
IP17-1	Straight Run Diesel	1.43	0.22	800,000
IP17-2	Straight Run Diesel	1.43	0.22	800,000
IP17-3	Straight Run Diesel	1.43	0.22	800,000
IP19-1	Coker LCGO	0.69	0.27	800,000
IP19-2	Coker LCGO	0.69	0.27	800,000
IP20-1	DHDS ULSD Product	2.94	0.35	1,400,000
IP20-2	DHDS ULSD Product	2.94	0.35	1,400,000
IP20-3	DHDS ULSD Product	2.94	0.35	1,400,000
IP22-1	Hydrocracker Diesel	2.94	0.35	1,400,000
IP22-2	Hydrocracker Diesel	2.94	0.35	1,400,000
IP26-1	Ethanol	1.46	0.05	290,000
IP26-2	Ethanol	1.46	0.05	290,000
RP10-1	Jet Fuel (HC Kerosene)	2.93	0.15	1,400,000
RP10-2	Jet Fuel (HC Kerosene)	2.93	0.15	1,400,000
RP10-3	Jet Fuel (HC Kerosene)	2.93	0.15	1,400,000
RP11-1	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-2	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-3	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-4	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-5	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-6	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-7	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-8	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-9	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-10	ULSD Diesel Product	2.60	0.18	1,400,000
RP11-11	ULSD Diesel Product	2.60	0.18	1,400,000
SS9-1	Amine (Rich)	0.61	0.06	1,240,000
SS10-1	Amine Swing Tank (Either Sour or Sweet)	0.61	0.06	1,240,000
SS20-1	Kerosene Product (with Additives)	0.13	0.23	290,000
SS21-1	Diesel Product (with Additives)	0.10	0.23	290,000

**From:** Allen, Mike [Mike.Allen@mustangeng.com]  
**Sent:** Friday, August 29, 2008 3:21 PM  
**To:** 'Colin Campbell'  
**Cc:** 'Preston Phillips'; Corky Frank External; Migliavacca, Julian  
**Subject:** EMT-14192-009 Details of Tank Farm incineration Unit Estimate 3.1.3 / 11.1

Colin

As Additional back up for the Order of Magnitude estimates provided to Hyperion for the Tank Farm Vapor Recovery we offer the following:

The estimate is broken down into two major components:

- The tank farm recovery incineration unit.
- Piping, Instrumentation, and electrical to recover vapor from the tanks

The two sections were estimated with two different methods. What follows will be a short discussion of the method for each section:

#### Vapor recovery incineration

Order of magnitude estimate for refinery facilities are normally done by a factor method the uses a cost for major tagged as a basis for the factor.

Costs are added to the base equipment cost using a factor to account for the installed commodities required for the facility.

The major equipment cost for this estimate was developed from informal pricing from a typical equipment supplier.

An estimate such as this can be generated using an overall cost factor but the factor is generally composed of the following cost elements and the percentage normally obtained from completed projects:

1. Major Equipment	15%
2. Commodity Material and Construction Cost	60%
3. Engineering	15%
4. Client Cost.	10%
Total	100%

The overall cost factor as a multiplier on major equipment that results from this type of breakdown is  $100/15 = 6.66$  which rounds off **6.5**.

As further explanation for Item 2:

In a refinery the largest single component of the cost is the Commodity cost. This is broken down in the following components:

1. Piping	25%
2. Concrete/ Sewers and Structural	20%
3. Instrument Electrical	10%
4. Insulation Paint and Other	5%
Total	60%

These items are required because the incineration installation will require foundations, fluid and gas services, sewer services, electrical services, and associated instrument controls located remotely from the incinerator. In a refinery, all equipment and piping must be built to standardized codes typical to refinery construction (such as API) and must conform to electrical classification standards for hazardous areas.

### **Tank Piping / Instrument and Electrical**

This part of the estimate was done as a quantity based estimate. A plot plat was used to develop estimate linear footage of piping for the recovery. Sweep gas lines were included. The cost of the vapor lines and sweep gas lines for tanks is the extension of number of tanks times linear footage per item times unit cost. The cost for headers is the total quantity in linear feet times the unit cost.

The unit cost is the all-in installed cost per linear foot of piping

All costs have been escalated by 10% because the base costs used for the estimate are 2007 costs.

Mike Allen